

### **REMARKS/ARGUMENTS**

Reexamination of the captioned application is respectfully requested.

#### **A. SUMMARY OF THIS AMENDMENT**

By the current amendment, Applicants basically:

1. Editorially amend the specification.
2. Decline the Examiner's suggestion to label Figs. 12 and 13 as "Prior Art", but instead label Figs. 12 and 13 as "Conventional Art" on replacement sheets which are electronically submitted on even date herewith.
3. Amend independent claim 1 to include therein limitations of dependent claim 2 (see section C below).
4. Amend the dependency of dependent claim 3.
5. Cancel original dependent claim 2 without prejudice or disclaimer.
6. Add new claims 21-34 (see section C below).
7. Respectfully traverse all prior art rejections (see section D below).
8. Provide an English language translation of Matsumoto JP 7-128685 (see section E below)

#### **B. THE DRAWINGS**

Applicants respectfully decline the Examiner's invitation to label Figs. 12 and 13 as "Prior Art". Applicants' specification describes both Fig. 12 and Fig. 13 as pertaining to a "conventional" active matrix substrate. Accordingly, Fig. 12 and Fig. 13 have been labeled as "Conventional Art" on replacement sheets which are electronically submitted on even date herewith.

### C. THE AMENDED CLAIMS AND NEW CLAIMS

Amended independent claim 1 incorporates limitations of original dependent claims 2 and 3 into independent claim 1, so that independent claim 1 now requires a light shielding film having an insulating property.

New independent claim 21 resembles original independent claim 1, but concludes with the following paragraph limitation: "a size of the gap being set to provide a desired  $\Delta\Delta\beta$  value which is interrelated with display unevenness". Support for the last paragraph of new independent claim 21 is manifest throughout the disclosure, including (for example) paragraphs [0076] - [0078]<sup>1</sup> and Fig. 5.

As an aside, Applicants point out that the definition of  $\Delta\Delta\beta$  and its determination are clearly described in Applicants' specification, such as (for example), specification paragraphs [0135] – [0148]. Mentioned here briefly is the fact that a  $\Delta\Delta\beta$  determination depends both on capacitance between a pixel electrode and a corresponding source (line) and capacitance between a pixel electrode and a non-corresponding source (line).

New dependent claim 22 includes the further limitation of a light shielding film provided over the signal line and the gap, the pixel electrode being provided over at least a portion of the light shielding film. New dependent claim 22 is supported, e.g., by the black matrix (BM) 8 mentioned throughout the disclosure. The light shielding film is made the subject of a dependent claim since independent claim 21 has written description for a substrate without a light shielding film as evidenced, for example, by paragraphs [0082], [0083], and [0085], for example.

New dependent claim 23 – 24 resemble original claims 9 and 10, respectively.

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<sup>1</sup> References to specification paragraphs are paragraphs of the corresponding US Patent Publication US 2004/0141100 A1.

New dependent claim 25 concerns the gap size "y" illustrated, e.g., in Fig. 3 and Fig. 4, and described, e.g., in specification paragraph [0103].

New dependent claim 26 specifies that the desired  $\Delta\Delta B$  value is not more than 0.08, is preferably not more than 0.04, and is preferably not more than 0.01. New dependent claim 26 is supported, e.g., by specification paragraph [0077].

New dependent claim 27 is directed to the second embodiment of Fig. 4 (described, e.g., in paragraph [0092]+, wherein the interlayer insulating film comprises a stacking body, the stacking body comprising an upper interlayer insulating film and a lower interlayer insulating film.

New dependent claim 28 and 29 depend from new dependent claim 28. New dependent claim 28 specifies that the upper interlayer insulating film has a dielectric constant of about 3.7. Support for new dependent claim 28 resides, e.g., in specification paragraph [0092]. New dependent claim 29 specifies that the upper interlayer insulating film has a thickness of about 2.5  $\mu\text{m}$ . Support for new dependent claim 29 resides, e.g., in specification paragraph [0135].

New dependent claim 30 states that the gap has a width in a range of not less than 1  $\mu\text{m}$  and not more than 20  $\mu\text{m}$ . New dependent claim 30 is supported, e.g., by page 24 of the specification as filed and specification paragraphs [0076] - [0078], for example.

New dependent claim 31 specifies that the pixel electrodes of the substrate are driven by a dot reversal driving system. Support for new dependent claim 31 resides, e.g., in specification paragraphs [0138]+, for example.

New dependent claim 32 further requires an active device associated with each pixel electrode, the active device having a gate electrode and at least part of a source

electrode, the pixel electrode being formed over a gate electrode and at least part of a source electrode of its associated active device. Support for the active device limitations, and particularly that the pixel electrode is formed over a gate electrode and at least part of a source electrode of its associated active device, is evident from, e.g., Fig. 3 and Fig. 4.

New independent claim 33 also concerns the gap size "y" illustrated, e.g., in Fig. 3 and Fig. 4, and described, e.g., in specification paragraph [0103]. New independent claim 33 and dependent claim 34 are also understood with reference to other newly added dependent claims already discussed above.

#### **D. PATENTABILITY OF THE CLAIMS**

Claims 1-2, 4, 6, 8, 10, 13, 16 and 19-20 stand rejected under 35 USC 102(b) as being anticipated by Matsumoto (JP07-128685). Claims 3, 5, 7, 9, 11, 14 and 17 stand rejected under 35 USC 103(a) as being unpatentable over Matsumoto (JP07-128685) in view of U.S. Patent 6,396,470 to Zhang et al. Claims 12, 15 and 18 stand under 35 USC 103(a) as being unpatentable over Matsumoto (JP07-128685) in view of U.S. Publication 2001/0026342 to Ejiri et al.

Applicants respectfully traverse all prior art rejections. To facilitate a proper understanding of Matsumoto JP 7-128685, and thereby the patentability of Applicants' claims, Applicants herewith provide a complete English language translation of Matsumoto JP 7-128685 (*see* remarks section E *infra*) and refer to paragraphs of the English language translation of Matsumoto JP 7-128685 in the ensuing discussion.

##### Amended Independent claim 1

Independent claim 1 now includes limitations of dependent claims 2 and 3, and as such requires a light shielding film having an insulating property. Independent claim 1 thus relates to a display device substrate in which a pixel electrode is formed on an interlayer insulating film so that a source line and the pixel electrode are separately

positioned with the interlayer insulating film intervening therebetween. The claimed subject matter of independent claim 1 improves display unevenness caused by variation of a parasitic capacitance in a display area which occurs between a transparent pixel electrode and a signal line on the interlayer insulating film. In order to achieve this advantage, as described in Applicants' specification (*see*, e.g., page 15, line 22 to page 16, line 2), a liquid crystal layer has an area to which a voltage is not applied from the pixel electrode when voltage is applied to the pixel electrode. The area to which the voltage is not applied is a gap between the pixel electrode and the signal line. No potential is applied to the gap.

In contrast, the object of Matsumoto (JP07-128685) is to "provide a high-resolution liquid crystal display device that does not cause crosstalk and provides a large aperture ratio, without sacrificing display quality or reliability" (paragraph [0007] of Matsumoto). In order to achieve Matsumoto's object, it is essential to cause the black matrix to have a specific potential, so that it is essential to form the black matrix 8 by using a metal material (paragraph [0012] of Matsumoto) and it is essential to cover a majority of source lines by the black matrix having the specific potential (*see*, e.g., claim 1 and paragraph [0012] of Matsumoto).

Matsumoto is arranged so that the signal line is covered by a wiring layer (shield layer) to which the specific potential is applied in order to prevent crosstalk. Matsumoto does not teach or suggest provision of a gap (covered by only a layer having an insulating property) between the signal line and the pixel electrode.

A main feature of Matsumoto is that the light shielding film be provided on the source line. However, as explained above, the light shielding film of Matsumoto is only a wiring layer (shield layer). Matsumoto does not state that the Matsumoto wiring layer is not provided between the pixel electrode 3 and the source line 2.

Thus, in order to solve the problem described in Matsumoto, it is essential for Matsumoto to provide a conductive film which can serve also as the shield layer.

It is essential for Matsumoto to have the conductive wiring layer (shield layer) as explained above. Matsumoto tries to improve the aperture ratio by causing the wiring layer to serve also as the light shielding film. As apparent from paragraph [0018] of Matsumoto, the wiring layer (the shield layer, which has an electrically conductive property) is provided between the pixel electrode 3 and the source line 2 regardless of whether the light shielding film is provided between the pixel electrode 3 and the source line 2 or not.

With reference to Matsumoto, the person skilled in the art learns that it is possible to reduce crosstalk by providing the wiring layer (shield layer) having an electrically conductive property between the pixel electrode 3 and the source line 2. From Matsumoto the person skilled in the art would deduce that it is necessary to provide the light shielding film apart from the wiring layer as described in paragraph [0018] of Matsumoto if, for example, the light shielding film of Matsumoto is made of insulating resin. That is, in case of combining Matsumoto and U.S. Patent 6,396,470 to Zhang et al., the structure of Matsumoto is arranged so that, in addition to the wiring layer (shield layer), the light shielding film is provided on a side opposite to the counter substrate as illustrated in Fig. 8 of U.S. Patent 6,396,470 to Zhang et al.

As explained above, Matsumoto is arranged so that the wiring layer (shield layer) to which a specific potential is applied serves also as the light shielding film, but the light shielding film to which a specific potential is applied does not serve also as the wiring layer. In Matsumoto, the insulating light shielding film never serves also as the wiring layer (shield layer) to which a specific potential is applied. Thus, even if U.S. Patent 6,396,470 to Zhang et al. were to disclose a light shielding film made of insulating resin,

the insulating resin would still have to be utilized with the Matsumoto wiring layer. Consequently, the concocted combination would not have a gap covered by only a layer having an insulating property.

Further, Matsumoto discloses an arrangement in which the black matrix 3 overlaps with the pixel electrode 3. However, this arrangement is made in order to form a storage capacitance between the black matrix 8 and the pixel electrode 3 in the overlapping portion, so that it is essential that the black matrix 8 is the wiring layer (shield layer).

That is, Matsumoto teaches that the wiring layer (shield layer) overlaps with the pixel electrode, so that a storage capacitance is formed between the wiring layer (shield layer) and the pixel electrode. Matsumoto does not teach that an insulating light shielding film overlaps with the pixel electrode.

Of the arrangements of Zhang et al. (US6,396,470), Ejiri et al. (US6,208,390) and Kashimoto et al. (US6,157,433), none are arranged so that the pixel electrode is provided on the interlayer insulating film so that the source line and the pixel electrode are separately positioned with the interlayer insulating film intervening therebetween. Thus, none of these references provide a basis for denying patentability to Applicants' independent claim 1.

New Independent claim 21 (and claims 19 and 33)

New independent claim 21 (as well as dependent claims 19 & 33) concerns the size of the gap. New independent claim 21 requires that a size of the gap be set to provide a desired  $\Delta\Delta\beta$  value which is interrelated with display unevenness. As explained in Applicants' specification, as the gap is increased to a certain extent, display unevenness is reduced more significantly. By setting the gap to 1  $\mu\text{m}$  or more, it is possible to decrease the  $\Delta\Delta\beta$  value down to 0.08 or less. On the other hand, as the gap is larger, the

aperture ratio decreases. However, the  $\Delta\Delta\beta$  value is sufficiently decreases which results in saturation, so that it is impossible to reduce the  $\Delta\Delta\beta$  value so as to correspond to an increment of the gap. Thus, by setting the gap (e.g., in a range such as that recited in claims 19 & 33), it is possible to sufficiently improve the display unevenness of the display device and suppress decrease of the aperture ratio.

The limitations of new independent claim 21 (and claims 19 & 33) are not taught or suggested by Matsumoto, either alone or in combination.

In the above regard, Matsumoto describes its inventive embodiment in Fig. 1 and Fig. 2, and a variation thereof in Fig. 3. In the text describing these figures, Matsumoto teaches an overlap of black matrix 8 and a pixel electrode 3, with the black matrix covering and extending wider than the source line by 2  $\mu\text{m}$  or greater. This teaching does not imply that there has to be a gap between the pixel electrode 3 and the source line 2, although such gap happens to be shown in Fig. 2. The lack of comment by Matsumoto regarding a gap between the pixel electrode 3 and the source line 2 implies that the gap itself is not important (much less its size), and that pixel electrode 3 could extend further over BM 8 to the edge of the signal line 2. While Matsumoto cryptically illustrates a gap, there is no teaching or recognition that the gap size can be controlled to affect a  $\Delta\Delta\beta$  determination and hence display unevenness.

Moreover, while Matsumoto does address capacitive coupling, the solution of Matsumoto does not involve the size of a gap. Rather, and as explained above, Matsumoto addresses the capacitive coupling by its application of electrical potential to BM 8. That is, to provide capacitive control, Matsumoto connects the black matrix 8 to specific electrical potentials in regions around the panel (so that BM 8 will not be floating), which further shows that Matsumoto relies on the electrical potential of BM 8 to counter capacitance, not the size of a haphazardly illustrated gap.



Moreover, Matsumoto does not consider prevention of display unevenness caused by variation of the parasitic capacitance in the display area which occurs between the pixel electrode and the signal line. Further, Matsumoto does not disclose that it is possible to sufficiently improve the display unevenness quality of the display device and it is possible to suppress decrease in the aperture by defining or controlling a gap between the pixel electrode and the signal line.

Thus, Matsumoto fails to appreciate, anticipate, or address a need to improve the display unevenness quality of the display device and yet suppress decrease in the aperture by setting a gap to the specific range.

Further, paragraph [0012] of Matsumoto discloses that the black matrix is wider than the line width of the source line by 2  $\mu\text{m}$  or greater. If the wiring layer (shield layer) of Matsumoto is wider than the line width of the source line by 2  $\mu\text{m}$ , the wiring layer (shield layer) overlaps with the pixel electrode as recited in claim 1 of Matsumoto. In view of this, the gap between Matsumoto's source line 2 and the pixel electrode 3 is considered to be less than 1  $\mu\text{m}$ . Further, neither the size of the gap (as claimed in dependent claim 19) nor the width of the overlapping portion between the black matrix and the pixel electrode are disclosed by Matsumoto. Thus, the office action is incorrect in alleging that any gap between the Matsumoto source line 2 and pixel electrode 3 is 1  $\mu\text{m}$  or greater and 20  $\mu\text{m}$  or less.

#### New Independent claim 33

New independent claim 33 concerns, e.g., the gap size "y" illustrated, e.g., in Fig. 3 and Fig. 4, and described, e.g., in specification paragraph [0103]. Applicants find no teaching or suggestion of the subject matter of new independent claim 33 in the applied prior art.

#### **D. PROVISION OF TRANSLATIONS**

JP 7-128685 was previously submitted in an IDS filed March 29, 2005, along with a Taiwanese Patent Office Action (mailed February 15, 2005) which applied JP 7-128685. Another foreign reference, Korean Patent Publication 1998-38039, was cited in a subsequent Information Disclosure Statement (IDS) filed December 29, 2005. Attached hereto are full English language translations of both JP 7-128685 and Korean Patent Publication 1998-38039. Also attached hereto is a SB/08a or comparable form listing both Matsumoto JP 7-128685 and Korean Patent Publication 1998-38039 and indicating that full translations were submitted. It is respectfully requested that the attached SB/08a be initialed and returned in due course to the undersigned.

#### **E. MISCELLANEOUS**

In view of the foregoing and other considerations, all claims are deemed in condition for allowance. A formal indication of allowability is earnestly solicited.

The Commissioner is authorized to charge the undersigned's deposit account #14-1140 in whatever amount is necessary for entry of these papers and the continued pendency of the captioned application.

Should the Examiner feel that an interview with the undersigned would facilitate allowance of this application, the Examiner is encouraged to contact the undersigned.

Respectfully submitted,

**NIXON & VANDERHYE P.C.**

By:                     /H. Warren Burnam, Jr./

H. Warren Burnam, Jr.,

Reg. No. 29,366

HWB:lsH

901 North Glebe Road, 11th Floor  
Arlington, VA 22203-1808  
Telephone: (703) 816-4000  
Facsimile: (703) 816-4100

Other Electronic Submissions:

- (1) PTO SB/08a
- (2) English translation of JP 7-128685
- (3) English translation of Korean Patent  
Publication 1998-38039
- (4) Replacement Sheets for Figs. 12 & 13